

2021 Astrophysics Explorers

Concept Study Step 2 Questions & Answers

Change Log		
Revision	Date	Description of Changes
01	09/27/2022	Added Q&A 1 – 5
02	11/02/2022	Added Q&A 6 – 7
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07	04/12/2023	Revised Q&A 5
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Q-1 Page 8 of the Launch Services Information Summary states “Guidance reserves have been allocated to account for 3-sigma flight performance.” Should we take this to mean that margins to account for LV insertion errors are accounted for on the LV side and should not be part of the Spacecraft propellant budget? If part of the Spacecraft propellant budget, what launch vehicle insertion errors should we assume for each Scenario, given that we are launching into a high energy orbit?

A-1 The spacecraft propellant budget must include a margin for LV insertion errors.

For Scenario 1 High Energy, the customer should assume C3 dispersions between $\sim \pm 0.25 \text{ km}^2/\text{s}^2$ and $\sim \pm 0.5 \text{ km}^2/\text{s}^2$, depending on their payload mass (heavier is better for accuracy).

For Scenario 2 High Energy, the customer should assume C3 dispersion $\sim 0.1 \text{ km}^2/\text{s}^2$.

The Declination of Launch Asymptote (DLA) and Right ascension of Launch Asymptote (RLA) dispersion numbers are not available, but it's common to see requirements around 0.1 deg.

Q-2 Where technologies are proposed that are not yet mature to TRL 6, is the proposed backup plan evaluated against the baseline science?

A-2 Yes. TMC only considers the Baseline Science Mission (see Section 5.1.4 of the MIDEX AO and Section 5.2.3 of the PEA) when evaluating the CSRs. Backup plans are required for technology not yet at TRL 6, and TMC evaluates those plans against the Baseline Science Mission. Proposals generally include less-mature technologies to enable more ambitious baseline science. A team proposing less-mature technology should make its best case for the approach to maturing that technology, and its best argument that the backup technology will produce science that will also meet the baseline or will produce science only slightly degraded from the baseline. Factor B-4 of the Science Implementation review considers the backup plans in the context of the threshold mission.

Q-3 How is the threshold science mission assessed?

A-3 Requirement B-18 of the MIDEX AO and the SALMON-3 defines the threshold science mission as the "minimum acceptable data and scientific return for the

mission, below which the mission would not be worth pursuing." The scientific value of the Threshold Mission is considered in the Form A review. In the Science Implementation review, factor B-4 assesses "the approach to descoping the Baseline Science Mission to the Threshold Science Mission" if development problems force a reduction in scope, while the maturity of both baseline and threshold Level 1 science requirements are assessed under Factor B-7 in the CSR Guidelines. Section E.1 of the CSR Guidelines specifies that draft mission success criteria should be based on the threshold science requirements.

Q-4 Are templates provided for all the Microsoft Excel files that are required to be submitted with the CSR document?

A-4 Microsoft Excel templates for the Science Traceability Matrix and the Mission Traceability Matrix, the cost tables 3a/3b, the MEL and the conflicted party list are provided in the Program Library. Excel templates are not provided for the other cost tables required in Sections J and K of the CSR Guidelines.

Q-5 Please confirm that the Phase B Contract Implementation Data is not due until the Site Visit.

A-5 The answer is institution dependent:

- ~~Because~~Although the Explorers Program Office does not issue contracts to NASA Centers, these institutions are ~~not~~ required to address Appendix L.4 Phase B Contract Implementation Data so contracts can be issued as soon as possible to vendors and supporting institutions. However, this may be delayed from CSR submission to each mission's Site Visit.
- Because of constraints on modifications to JPL task orders, missions for which the Explorers Program Office awarded the institution Phase A task orders are required to provide draft Phase B task plans, which will facilitate modification of the applicable JPL task order(s) upon down-selection. These are not required until each mission's Site Visit.
- Institutions to which the Explorers Program Office awarded a Phase A contract will be required to provide Appendix L.4 Phase B Contract Implementation Data. However, this may be delayed from CSR submission to each mission's Site Visit. *[Amended 04/12/2023]*

Q-6 Please verify that Phase B bridge contracts are for 5 months.

A-6 Yes, as stated in the Phase-A kickoff presentation, they are for 5 months.

Q-7 Do CSRs need to define Level 3 requirements?

A-7 No, only Level 1 and Level 2 requirements must be defined and are evaluated by the TMC panel. Level 3 requirements could be beneficial if there is strong logical flow down from good Level 2 requirements. Good Level 3 requirements show maturity and demonstrate that the project is ready to execute and get off to a quick start after down-selection.

Q-8 Part III of the CSR Guidelines and Criteria document notes that satellites operating in Earth orbit are now required to follow enhanced procedures to avoid collisions, beyond what was required under NPR 7120.5E as referenced in the AO. What costs for collision avoidance procedures must be covered within the PIMMC?

A-8 Section 4.6.4 of the MIDEX AO specifies that “an investigation to which NPR 8715.6B, Chapter 3 is applicable will have to budget costs under the PI-Managed Mission Cost to establish a working interface between the Flight Operations Team and the CARA or MADCAP team in the Concept Study Report. This interface will be used to routinely share orbital ephemerides data and covariance data, any maneuvering plans, and to perform any maneuver planning activities required for collision avoidance once on orbit.” The costs for establishing this interface must be budgeted under the PIMMC. The cost to comply with requirements under the NID 7120.132, or its planned replacement, that go beyond what was required by NPR 8715.6B will be outside the PIMMC.

Q-9 The Federal Communications Commission adopted a new rule (September 29, 2022) requiring satellites in low-Earth orbit to de-orbit no later than 5 years after their mission is complete. Will missions in the current competition be required to comply?

A-9 NASA has not yet announced a path to implementation.

Q-10 In the Rideshare Users Guide, item 6.3.5.1 requires that the first fixed-free fundamental frequency shall exceed 75Hz. However, the closing sentence implies that a lower fundamental frequency would restrict, but not eliminate, flight opportunities. Is information available on how severe the restriction would be, as a function of the fundamental frequency?

A-10 The 75Hz requirement is based on current experience and may change over time, and as new launch vehicles become available. It is not possible to determine whether a lower fixed-free fundamental frequency would be sufficient until a coupled-loads analysis can be performed for the launch vehicle together with the primary payload and any other rideshares. This analysis cannot be done until late in the mission design, when a launch service has been selected and a specific flight opportunity identified. If a rideshare payload is determined to couple adversely with the primary or other rideshares, it may have to be demanifested to await a different flight opportunity. At the TMC review an evaluator from the Launch Services Program will be available to help in assessing the risk posed by a first fixed-free fundamental frequency below 75Hz.

Q-11 For the Scenario 2 LV described in the Launch Services Information Summary, is there a significant difference in the capability to an orbit at 5 degrees inclination as compared to an equatorial orbit?

A-11 For a 600 km circular orbit, it is safe to assume a capability of 1650 kg for the orbit at 5 degrees inclination, versus 1300 kg for an equatorial orbit.

Q-12 The Space Communications and Navigation (SCaN) Mission Operations and Communications (MOCS) document in the program library describes TDRS services available to proposing teams to support their mission operations. However, the document also states: “SCaN is pursuing commercialization of services for near-Earth users in the 2020s and beyond. The transition to commercial services, particularly the space-based relay and gradual phase-out of TDRS services for new users, will be an evolving and fluid process requiring coordination between SCaN and the mission community.” Should the Phase A study be based on the assumption that existing TDRS services will be available?

- A-12 Yes, the Phase A study may assume access to existing TDRS services. Definite information on the phase-out of TDRS services and on future commercial services is not yet available. Changes to the TDRS services described in the MOCS document constitute a programmatic risk, which is not assessed in the TMC evaluation.
- Q-13 **Because early procurements are key to mitigating supply chain risk, the draft New Frontiers 5 AO has removed the limit that no more than 25% of the PI-Managed Mission Cost may be spent before KDP-C. Missions currently in Phase A study for the 2021 Astrophysics MIDEX/MO will face those the supply chain issues much sooner than a New Frontiers mission. Will this restriction (Requirement 60 in the MIDEX AO) be waived for the 2021 Astrophysics Phase A studies?**
- A-13 If a study team plans to spend more than the required cap in Requirement 60 of the MIDEX AO, or Requirement 75 of the SALMON-3 AO for MO, the CSR must provide justification and show how this would reduce risk. The evaluation panel will assess the risk posed to the mission, and will take that into account in its final risk rating.
- Q-14 **The newest NASA inflation index at: <https://www.nasa.gov/content/nasa-new-start-inflation-index> (2022_nasa_new_start_inflation_index_for_fy23_final) updates the inflation table from that provided in the Program Library and provides a more accurate picture of forward pricing. Is it acceptable to use the latest published NASA inflation index to generate Real Year costs?**
- A-14 Yes. Please document the inflation rates used per Requirement CS-57. The filename of the inflation indices currently provided in the Program Libraries is 2021_nasa_new_start_inflation_index_for_fy22_final.
- Q-15 **Does Requirement CS-66 mean that unfunded collaborators must provide an institutional Letter of Commitment (LoC) in addition to their personal letters of commitment? Does this requirement apply to both U.S. and non-U.S. institutions, based on the effort they will contribute to the project? Please confirm, as the institution piece was not required for Step1.**
- A-15 Yes, unfunded collaborators will need a LoC from their institutions based on their contributions to the project. This applies to both U.S. and non-U.S. institutions (see Requirement CS-67 for the latter). These LoCs were not

required in Step 1, but they are required in Step 2. In addition, costs representing the contributed effort of the collaborators need to be included in the Cost Tables, per Requirement CS-55.

Q-16 Are separate CSR files, with export-controlled material redacted, required to be submitted?

A-16 No, this part of Requirement CS-3 has been removed, and the updated Guidelines and Criteria document has been posted. Export-controlled material should be marked in accordance with Section 5.8.3 of the MIDEX AO or Section 5.9.3 of the SALMON-3 AO.

Q-17 Will the TMC Panel provide comments to NASA regarding career development opportunities for future engineering and management leaders?

A-17 Yes, the Guidelines and Criteria document was amended on May 9, 2023, to be in accordance with the AO and the PEA on this matter.

Q-18 Does every named person in the CSR require a personal letter of commitment, or just major or critical participants? If so, are emails permitted for the individual LOCs?

A-18 In accordance with Requirement CS-66, personal letters of commitment signed by the individual shall be provided from (iii) every Proposal Team member as defined in Section 5.8.2 of the MIDEX AO or Section 5.9.2 of the SALMON-3 AO. Those sections of the AOs define the Proposal Team to include, but not be limited to, all named Key Management Team members, all Co-Is, and all collaborators. Yes, for item (iii) above, an email sent from the individual Proposal Team member to the PI stating the member's commitment will be sufficient to satisfy the signature requirement in Requirement CS-66.

Q-19 Is the provision of certified vendor pricing still required by the Step-2 site visit?

A-19 No, the Guidelines and Criteria document was amended on July 5, 2023, so that Requirement CS-70 is no longer applicable. Instead, data will be required upon down-selection.

Q-20 The Site Visit instructions say, “The Evaluation team may provide additional day-of SQRLs to the Study team at 8:00 p.m. on the first day of the Site Visit. Responses are due during the presentations of second day of the Site Visit.” Can these SQRLs be sent any earlier?

A-20 Unfortunately, we cannot push the delivery of Day 1 Site Visit SQRLs any earlier. The study team should ask to defer to the due date of the post-Site Visit SQRLs anything that it thinks will need significant work to answer and concentrate on providing any responses that are easily addressable during Day 2 of the Site Visit.